UNIVERSITY OF KENTUCKY®

President's Report
April 2013

Guo Lab Discovers New Class of Revolution Biomotor and Solves Mystery in Viral DNA Packaging

Scientists at the University of Kentucky have cracked a 35-year-old mystery about the workings of natural "biomotors." These molecular machines are serving as models for development of synthetic nanomotors that will someday pump therapeutic DNA, RNA or drugs into individual diseased cells.

Peixuan Guo, director of the UK Nanobiotechnology Center, and his colleagues explain that two motors have been found in nature: A linear motor and a rotating motor. Now they report discovery of a third type, a revolving molecular motor.

Guo's team wants to embed a synthetic version of that motor into nanomedical devices that are injected into the body, travel to diseased cells and pump in medication. A major barrier in doing so has been uncertainty and controversy about exactly how the phi29 motor moves. Scientists thought that it worked by rotating or spinning in the same motion as the Earth turning once every 24 hours upon its own axis.

In their ACS Nano paper, Guo — with his team — challenge that idea. They discovered that the phi29 motor moves DNA without any rotational motion. The motor moves DNA with a revolution in the same motion as the Earth revolving around the sun in one orbit ever 365 days. The "revolution without rotation" model could resolve a big conundrum troubling the past 35 years of painstaking investigation of the mechanism of these viral DNA packaging motors.

Guo points out that nanomotors will open the door to practical machines and other nanotechnology devices so small that 100,000 would fit across the width of a human hair. One major natural prototype for those development efforts has been the motor that packages DNA into the shell of bacteriophage phi29, a virus that infects and kills bacteria.

UK Sets New Records for Honors Program, National Merit Scholars

An intense focus on academic and student quality at UK is reaping dividends, as evidenced by record results in both the current and upcoming first-year classes (fall 2012 and fall 2013).

UK President Eli Capilouto reported to the Board of Trustees that UK ranks 11th among public universities (out of 123), and 30th among public and private universities (out of 335) in the number of National Merit/National Achievement Scholars in the Fall 2012 first-year class, according to the National Merit Scholarship Corporation's annual report.

Capilouto also cited preliminary numbers from the expanding and revitalized Honors Program in which applications have more than doubled, while the academic quality of students applying continues to increase as well.

With respect to National Merit/National Achievement Scholars, Capilouto said it was particularly noteworthy that UK, with 71 National Merit/National Achievement scholars, is ahead of some of the most prominent institutions in the country, including: Emory (53), the University of Georgia (56), Michigan (53), Michigan State (40), University of Virginia (35), Carnegie Melon (38), Johns Hopkins (32), Cornell (66), Ohio State (62), New York University (28), Notre Dame (51), and Georgetown (39).

These dividends are also affirmed through the success of the UK Honors Program. With a recently adapted curriculum that allows for a more personalized Honors experience, the program has experienced a record number of applicants for the fall class of 2013: more than 2,400 applications for a class of approximately 450. Last year's record application pool topped out at 1,200.

Gatton College Reaches Fundraising Milestone

In March, the University of Kentucky's Gatton College of Business and Economics celebrated the milestone of surpassing the halfway point in its fundraising efforts for the expansion and renovation of its facilities. Joined by UK President Eli Capilouto, Gatton College Dean David W. Blackwell announced that nearly $34 million in private funds has been donated or pledged toward the $65 million project.

In particular, Blackwell cited the large gifts of C.M. "Bill" Gatton, Don and Cathy Jacobs, Howard Lewis, and Bill Seale. Together, these donors have contributed approximately $23 million to this ambitious undertaking.

The dean thanked the nearly 300 individuals, foundations, and corporations for their generosity in supporting the project, which will nearly double the space available for students, faculty, and staff while also enabling the college to offer state-of-the-art technology throughout the building. The expansion and renovation plans call for a dramatic increase in space for educational offerings, as well as high-tech enhancements to classrooms and laboratories for students on both the undergraduate and graduate levels.